IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

U. S. Patent
Application of: T. TAKABAYASHI
Serial Number : 10/647,170
Filed : August 21, 2003
For : ACTINIC RAY CURABLE COMPOSITION, ACTINIC RAY CURABLE INK, IMAGE FORMING METHOD, AND INK JET RECORDING APPARATUS
Group Art Unit: 1711
Examiner : Susan W Berman

DECLARATION UNDER 37 C.F.R. 1.132

Hon. Commissioner of Patents
and Trademarks
Washington, D.C. 20231

Sir:

I, TOSHIYUKI TAKABAYASHI, hereby declare and say as follows:

That I am a graduate from Kyoto University having been awarded a Bachelors Degree in Chemistry in March of 1992.

That since April of 1992, I have been employed by Konica Corporation (present Konica Minolta), the Assigner of the above-identified application. During my employment, I have been engaged in the research and the study of an actinic ray curable composition and ink jet ink in the Research and Development Laboratory of my company.

That I am a sole inventor of the present application.

That I am familiar with the subject matter of the present invention.

What follows is an accurate summary of experiments conducted according to my detailed instructions and under my personal supervision, and the results obtained therefrom.

1. The Examiner states on page 3, lines 9-18 of the Outstanding Office Action, "The Declaration under 37 CFR 1.132 of Toshiyuki Takabayashi filed 06/09/2005 has been considered but found unpersuasive. The evidence presented in the Declaration shows C-O bond length and charge on the O is different for oxetane compounds wherein substituents $R_3$ to $R_6$ are simultaneously hydrogen compared with oxetane compounds wherein substituents $R_3$ to $R_6$ are not simultaneously hydrogen (according to the invention). However, the evidence is not persuasive because Smith and Sasaki et al each teach to oxetane compounds wherein substituents $R_3$ to $R_6$ are not simultaneously hydrogen, as set forth in the instant claims. Applicant has not provided any evidence to show that selection of only oxetane compounds wherein substituents $R_3$ to $R_6$ are not simultaneously hydrogen provides unexpected results in the instantly claimed compositions compared with compositions comprising oxetane compounds wherein substituents $R_3$ to $R_6$ are simultaneously hydrogen."

In order to show unexpected results of the invention, additional comparative tests were carried out, based on the disclosure of Smith and Sasaki et al.

Smith does not disclose in detail examples of the oxetane compound of the formula set forth in column 6, lines 21-38. Smith discloses only one exemplified oxetane compound (hereinafter referred to as Oxetane compound 31 of Smith) in Example No. 31 (column 11) of the Smith Examples, which were considered to be best mode of Smith. Thus, Oxetane compound 31 was employed for comparative test.

Sasaki et al disclose, as a particularly preferable monomer, a cyclic ether represented by formula 3 (column 6, lines 8-27), and further disclose, as specific examples of the compound represented by formula 3, Oxetane compound OXT-212, in which in formula 3, $R_7$=$R_8$=H, $R_{10}$=ethyl, $R_9$=2-ethylhexyl, and X=oxygen, and Oxetane compound OXR-12, which is represented by formula 7 (column 6, lines 28-31). Then, Oxetane compound OXT-212 and Oxetane compound OXR-12 were employed for comparative test.

2. Preparation of Ink set samples

Ink set sample I-1 (Inventive) was prepared in the same manner as Ink set 2 in Example 1 of the present Specification. Ink set sample I-1 comprised Exemplified compound 7 as the oxetane compound in the invention.

Ink set sample I-2 (Inventive) was prepared in the same manner as Ink set 2 in Example 1 of the present Specification, except that Exemplified compound 23 was used as the oxetane compound in the invention instead of Exemplified compound 7.

Ink set sample C-1 (Comparative) was prepared in the same manner as Ink set I-1 above, except that Oxetane compound 31 of Smith was used instead of Exemplified compound 7.

Ink set sample C-2 (Comparative) was prepared in the same manner as Ink set I-1 above, except that Oxetane compound OXT-212 of Sasaki et al was used instead of Exemplified compound 7.

Ink set sample C-3 (Comparative) was prepared in the same manner as Ink set I-1 above, except that Oxetane compound OXR-12 of Sasaki et al was used instead of Exemplified compound 7. For reference, properties of the oxetane compounds used above are shown in Table III.

Table III

| Oxetane compounds | *C-O bond distance in the invention (nm) | Charge of the oxygen atom |
|---|---|---|
| Exemplified compound 7 | 0.1470 | |
| Exemplified compound 23 | 0.1443 | -0.299 |
| Oxetane compound 31 of Smith | 0.1460 | -0.277 |
| Oxetane compound OXT-212 of Sasaki et al | 0.1455 | -0.280 |
| Oxetane compound OXR-12 of Sasaki et al | 0.1456 | -0.278 |

As is apparent from Table III above, the C-O bond distance in the invention and charge of the oxygen atom of Oxetane compound 31 of Smith, Oxetane compounds OXT-212 and OXR-12 of Sasaki et al fall outside the claimed range of the C-O bond distance in the invention and charge of the oxygen atom.

3. Evaluation of Ink set samples

Each of the resulting ink set samples was mounted on an ink jet recording appratus as shown in Fig. 1 of the Specification, and image was recorded on a recording material under the same image recording conditions as sample No. 8 in Table 7 of the Specification.

The resulting ink set samples were evaluated for character quality and color contamination in the same manner as in Example 1 of the present Specification.

The reslts ares shown in Table IV.

Table IV

| Sample No. | Recording Circumstances | | | | | | Remarks |
|---|---|---|---|---|---|---|---|
| | 10 °C, 20% RH | | 25 °C, 50% RH | | 32 °C, 80% RH | | |
| | Character Quality | Color Contamination | Character Quality | Color Contamination | Character Quality | Color Contamination | |
| I-1 | A | A | A | B | B | B | Inv. |
| I-2 | A | A | A | B | B | B | Inv. |
| C-1 | C | C | D | D | D | D | Comp. |
| C-2 | B | B | C | C | D | D | Comp. |
| C-3 | C | C | D | D | D | D | Comp. |

Comp.: Comparative, Inv.: Invention

As is apparent from Table IV above, the inventive samples I-1 and I-2 each comprising the oxetane compound in the invention provide excellent character quality under various recording circumstances, and exhibit excellent recording property that no or little color contamination occurs under various recording circumstances, compared with comparative sample C-1 employing Oxetane compound 31 of Smith, or comparative samples C-2 and C-3 employing Oxetane compound OXT-212 and OXR-12 of Sasaki et al, respectively. The results are unexpected to one of ordinary skill in the art. Therefore, it would not have been obvious to one of ordinary skill in the art to arrive at the subject matter of claims 1, 6, 11, and 12 over Smith or Sasaki et al. In view of the above, claims 1, 6, 11, and 12, and all the claims, which depend therefrom, are in condition of allowance.

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001, of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated: August 24, 2005

Toshiyuki Takabayashi

TOSHIYUKI TAKABAYASHI